

CLAIMES:

1. A laminated structure for shielding against solar radiation sandwiching an intermediate layer containing fine particles functioning to block solar radiation between two pieces of sheets for laminating selected from sheet glass, plastic, or plastic containing fine particles functioning to block solar radiation,

wherein said fine particles having the function to block solar radiation comprise fine particles of tungsten oxide expressed by a general formula $WyOz$ where W is tungsten, O is oxygen, satisfying $2.0 < z/y < 3.0$, and/or composite tungsten oxide fine particles expressed by the general formula $MxWyOz$ where M is one or more elements selected from H, He, alkali metals, alkaline-earth metals, rare-earth metals, Mg, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Al, Ga, In, Tl, Si, Ge, Sn, Pb, Sb, B, F, P, S, Se, Br, Te, Ti, Nb, V, Mo, Ta, Re, W is tungsten, O is oxygen, satisfying $0.001 \leq x/y \leq 1$, and $2.0 < z/y \leq 3.0$.

2. A laminated structure for shielding against solar radiation, sandwiching an intermediate layer not containing fine particles functioning to block solar radiation, between a plastic sheet to be laminated containing fine particles functioning to block solar radiation, and a sheet to be laminated selected from sheet glass, plastic, or plastic containing fine particles functioning to block solar radiation,

wherein said fine particles functioning to block solar radiation comprise fine particles of tungsten oxide expressed by the general formula $WyOz$ where W is tungsten, O is oxygen, satisfying $2.0 < z/y < 3.0$, and/or composite tungsten oxide fine particles expressed by the general formula

M_xW_yO_z where M is one or more elements selected from H, He, alkali metals, alkaline-earth metals, rare-earth metals, Mg, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Al, Ga, In, Tl, Si, Ge, Sn, Pb, Sb, B, F, P, S, Se, Br, Te, Ti, Nb, V, Mo, Ta, Re, W is tungsten, O is oxygen, satisfying
 5 0.001≤x/y≤1, and 2.0<z/y≤3.0.

3. The laminated structure for shielding against solar radiation according to either of claims 1 or 2,

wherein the diameter of fine particles functioning to block solar radiation is not less than 1 nm and not more than 800.

10 4. The laminated structure for shielding against solar radiation according to any one of claims 1 to 3, wherein

the powder color in a L*a*b* colorimetric system of fine particles of said tungsten oxide and/or fine particles of said composite tungsten oxide is between 25 to 80 for L*, -10 to 10 for a*, and -15 to 15 for b*.

15 5. The laminated structure for shielding against solar radiation according to any one of claims 1 to 4,

wherein fine particles functioning to block solar radiation includes fine particles of composite tungsten oxide having a hexagonal or monoclinic crystal structure.

20 6. The laminated structure for shielding against solar radiation according to any one of claims 1 to 5,

wherein as the fine particles functioning to block solar radiation, a mixture of the fine particles is used, such as:

fine particles of said tungsten oxide and/or fine particles of said
 25 composite tungsten oxide; and

fine particles of at least one kind among fine particles of oxides, fine

particles of composite oxides, and fine particles of borides, formed by two or more elements selected from the group consisting of Sb, V, Nb, Ta, W, Zr, F, Zn, Al, Ti, Pb, Ga, Re, Ru, P, Ge, In, Sn, La, Ce, Pr, Nd, Gd, Tb, Dy, Ho, Y, Sm, Eu, Er, Tm, Tb, Lu, Sr, Ca.

5 7. The laminated structure for shielding against solar radiation according to claim 6, wherein the mixing ratio of the mixture of said fine particles of tungsten oxide and/or fine particles of the composite tungsten oxide with fine particles of at least one kind among fine particles of oxides, fine particles of composite oxides, and fine particles of borides, formed by two or more
10 elements selected from the group consisting of Sb, V, Nb, Ta, W, Zr, F, Zn, Al, Ti, Pb, Ga, Re, Ru, P, Ge, In, Sn, La, Ce, Pr, Nd, Gd, Tb, Dy, Ho, Y, Sm, Eu, Er, Tm, Tb, Lu, Sr, Ca, is from 95:5 to 5:95.

8. The laminated structure for shielding against solar radiation according to any one from claims 1 to 7, wherein said plastic is a sheet or film made of
15 polycarbonate resin, acrylic resin, or polyethylene terephthalate resin.

9. The laminated structure for shielding against solar radiation according to any one of claim 1 or claims 3 to 7, wherein said intermediate layer has an intermediate film, in which said fine particles functioning to block solar radiation are dispersed.

20 10. The laminated structure for shielding against solar radiation according to any one of claim 1, or claims 3 to 7, wherein said intermediate layer has an intermediate film stacked by two or more layers, and at least in one layer of which said fine particles functioning to block solar radiation are dispersed.

11. The laminated structure for shielding against solar radiation according
25 to any one of claim 1 or claims 3 to 7, wherein said intermediate layer includes a solar radiation blocking layer containing fine particles functioning

to block solar radiation and formed on the inner surface of at least either one of two sheets to be laminated selected from said sheet-glass and plastic, and an intermediate film overlapping with the solar radiation blocking layer.

12. The laminated structure for shielding against solar radiation according
5 to any one of claim 1 or claims 3 to 7, wherein said intermediate layer is formed in such a way that a solar radiation blocking ductile film substrate having a solar radiation blocking layer containing fine particles functioning to block solar radiation formed on one side or inside of a resin film substrate having ductility, is laminated between two or more stacked layers of
10 intermediate films.

13. The laminated structure for shielding against solar radiation according to any one of claim 1 or claims 3 to 7,

wherein said intermediate layer comprises:

an intermediate film or two or more stacked layers of intermediate
15 films, and

a layered body in which an adhesive layer, the solar radiation blocking layer containing fine particles functioning to block solar radiation, and a peeling layer are stacked in this order,

wherein the adhesive layer in said layered body adheres on the inner
20 surface of one sheet to be laminated selected from said sheet-glass or plastic, and

wherein the peeling layer of said layered body is adhered with said intermediate film or two or more layered intermediate film.

14. The laminated structure for shielding against solar radiation according
25 to any one of claims 2 to 7, wherein said intermediate layer includes an intermediate film not containing fine particles functioning to block solar

radiation or two or more layered intermediate films not containing fine particles functioning to block solar radiation.

15. The laminated structure for shielding against solar radiation according to any one of claims 9 to 14, wherein said resin to form said intermediate film
5 is vinyl base resin.

16. The laminated structure for shielding against solar radiation according to claim 15, wherein said vinyl base resin to form said intermediate film is polyvinyl butyral or ethylene-acetic acid vinyl copolymer.